Mount Zion Church Northeast Wall Stabilization Assessment Report

Report to Loudoun County Parks and Recreation
June 15, 2006
Produced by The John Greenwalt Lee Company

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Executive Summary

On June 6-8 2006, John Greenwalt Lee, Charles Phillips, and Ellen Hagsten assessed the potential of stabilizing the Northwest wall of Mount Zion Church by the repositioning of portions of the masonry rather than the demolition and reconstruction of the wall.

At this point it is appropriate to make the distinction between failure and collapse. Cracks in a mortar joint or breaks in a brick or stone are structural failures. Failure also includes a few stones falling out of the foundation. Failure is typically an isolated or localized event. Collapse is when a wall falls down or a floor fails. Collapse is a major system failure.

No imminent threat of collapse.

A number of localized failures were observed. However, upon measuring the extent of displacement from the sum total of these failures it was apparent that there was no imminent threat of collapse. The wall as a whole has moved such that little if any of the wall is significantly beyond the foundation directly below it. The center of gravity of the wall remains well within the foundation. Some small portions of the wall had earlier been restrained, causing those portions to deflect inward as the northwest wall moved out. With some portions of the wall bowed outward and others cinched inward, the northwest wall has a noticeable ripple that is visually alarming. However, since the portion of foundation below the bowed section of wall has also moved outward slightly, the wall remains quite stable. The exterior cracks in the wall were repointed several years ago and only a few have developed even hairline cracks, indicating that any current movement is minimal and may be primarily a thermal fluctuation.

Problems primarily related to localized saturation of the soil.

The primary forces that moved the wall are related to saturation of the soil between the church and the cemetery wall. When the soil becomes saturated it turns to jelly and squishes and slides, both dropping and moving the wall downhill. Redirecting the surface water movement should dry this area out and preclude future movement.

In the past, various plates and tie rods were installed to restrain movement. The location of the rods was dictated more by the desire to avoid visual intrusion than by structural considerations and the rods actually contributed to localized failure of the wall rather than reducing it.

Floor structure found to be sound.

While inspecting the foundations from the crawl space it was noted that there had been serious termite damage in the past. This damage has been adequately repaired, and while the work is not pretty, it is functional and not showing signs of additional damage or failure.

Recommendations:

1. Localized failure of the foundation should be corrected immediately to reduce the potential for future failures. Specifically, stones that have fallen into the crawlspace should be relaid and the foundation as a whole should be grouted to fill voids in the mortar.

2. Surface drainage should be redirected so that water does not move to the area between the church and the cemetery wall. This area currently receives all of the water from the roof of the church as well as much of the uphill runoff. If this area only received the rain that fell directly on it, there would be little or no failure in the Northwest wall.

3. The in and out deflection of the Northwest wall can be treated by clamping a straight edge to the wall horizontally. After removal of the tie rods, their holes can be utilized to pull both the in and the out deflections into a much closer alignment (back into plane with the corners). The realignment will be incremental; allowing the wall time to accommodate. Think of it similar to the process of straightening teeth: braces are put on and then tightened bit by bit, allowing the mouth to accommodate the new arrangement.

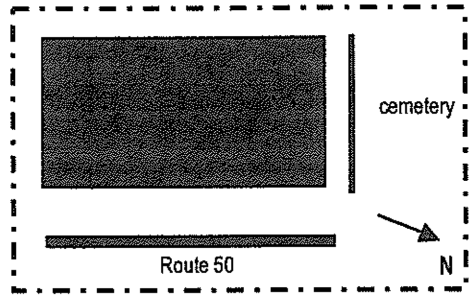
4. The other three walls have the balcony to aid in resisting deflection. They have not noticeably deflected, except for localized failure caused by the tie rods. After the bolts have been removed, the wall realigned, and the balcony set back on the ledge, an unobtrusive stiffener could be set into the ledge behind the pulpit to provide rigidity.

4. Cosmetic restoration/conservation of the interior finishes can proceed in coordination with the structural repairs and drainage issues. These finishes are not typical of modern construction and should be directed by conservators who understand the materials and methods used, especially the painted faux finishes and the plaster with whitewashes. Conservators will be better tasked to carefully uncover the historic graffiti.

5. The main ceiling is currently a beaded board likely installed early in the 20th century. It is not a typical bead-board with a center bead. The original ceiling was likely plaster. This bead board alteration is now almost 100 years old and would provide more character than replacement with modern flat plaster. If the intention is not to present the building as a restoration to the Civil War period, then retention of the board ceiling should seriously be considered.

Purpose of Assessment:

Given our expertise in realignment of masonry in place, we were asked to assess the feasibility and options for repairing the North wall without tearing it down to achieve stability. This approach would prevent the loss of historic fabric.



Initial Observations:

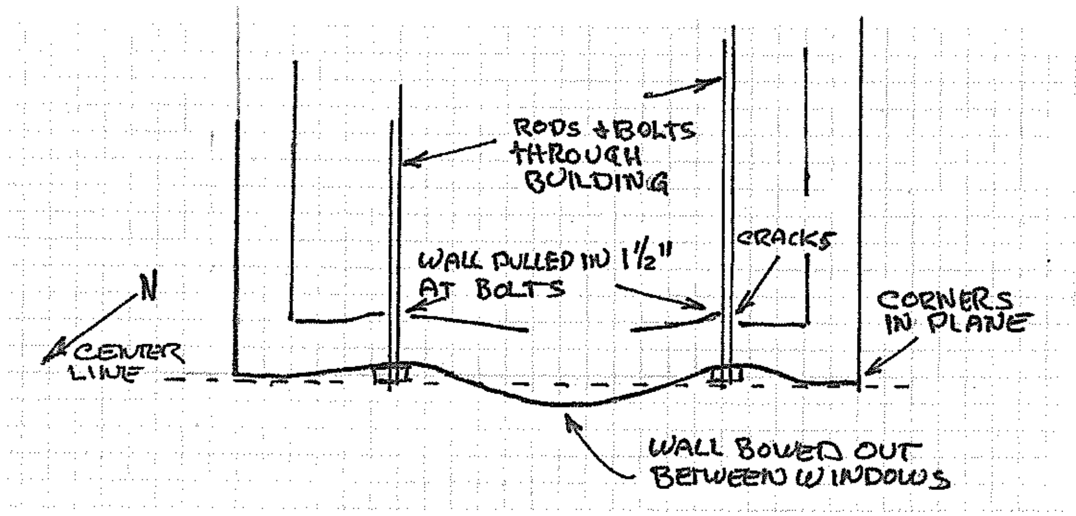
- The iron restraint brackets on the entrance side and the cemetery side have both been pulled inward.
- All of the water from the property is directed at the base of the building and is concentrated on the foundations of the Northwest end, directly opposite the cemetery wall. This lowest spot on the property is where the foundation is subsiding.
- The height of the grade has risen over time so that less than half of the stone foundation remains out of the ground. This has led to higher moisture conditions under the building. This grade rise has put the porous bricks in direct ground contact, a condition the builders specifically sought to avoid with stone foundations.
- The rear (west) downspout is both damaged at its base and not connected at the middle joint, leading to water running down the wall.
- Gutters are not hanging properly to collect roof water. The streetside gutter has rotated and drooped to direct water down the face of the wall. Worsened by inappropriate pointing on the lower section of wall, this water is feeding significant biological growth.
- Masonry over the two outermost second-story windows on the long walls (West and East) have sagged, apparently the result of an oversight in roof framing at the time of construction. Two trusses are aligned directly over the windows. The wooden lintel spanning these windows are forced to carry additional weight.
- Although there had been considerable termite damage under the floors at some time in the past, the floor has been adequately repaired with 2x10 oak joists. The repairs were installed with more than adequate bearing on the outside walls (3-7" where modern construction requires only 1-1/2"), and the area of overlap between joists at each of the central stone walls remains pegged. The work is not always pretty, but it is sound and functional. There are a few places where a screw or bolt to supplement the nails would provide a better attachment and would only increase the already adequate capacity by providing some additional redundancy.

Progression of Endwall Failure: *

1. Soil height against the building rises over time.
2. Cemetery wall is installed to protect the gravestones.
3. With the grade (soil height) rising above foundation stones onto bricks, water ponding at the base of the wall from ineffectual or non-existent gutters, and water stoppage at the cemetery wall a consistently wet environment is created under the building.
4. Termite damage occurs in the wet crawlspace, followed by competent repairs. Then vents are installed in the foundation instead of addressing grade-related water sources.
5. Consistent wet conditions begin to undermine the foundation of the cemetery-facing NW wall, leading to settling of the foundation and a downhill slide of the wall following the topography. This settling causes the end wall both to drop and to bow out at its center. The result is a structurally insignificant 1-1/2" outward deflection in the middle. The bow and drop are visible in the drop in the coursing on the Northern end of both long walls, in the stones falling out of the inside of the NW foundation wall, in the twisting of the first few joists against that wall, and in the downward slope of the interior stone walls where they join the NW foundation.
6. Responding to the deflection in the wall, or more specifically to the slight gap occurring between the end of the balcony and the wall, a decision is made to install bolts to restrain the wall. The first set of bolts is installed to tie the wall into the balcony framing.
7. The wall moves further and a decision is made to install bolts through the building to bind one outside wall to another (NW through to SE or cemetery-facing through to entrance wall). Although this would best be accomplished by grabbing the wall where it is bowing, the idea of having bolts running through the middle of the sanctuary and right through the pulpit is unpalatable. Bolts are placed at the next logical place: just inside the balcony.
8. Unfortunately, the balcony edge aligns closely with the wall panel between the first and second-story windows. In load-bearing masonry construction, the area below windows is inherently weakest. The walls are naturally held together by gravity and the weight of materials above. When windows are installed, most of the weight is transferred down either side of the window in a column effect through the design of the jack arches over the windows. The result is that the brick panel under a second-story window has only the very insubstantial weight of the window above to hold it together. Once a lateral force (pushing or pulling) is applied to these areas, they are quick to respond. Area around the windows can easily be deflected inward under pressure.
9. Screw-bolts are likely installed in the heat of summer and, as happens with iron and steel, they contract during winter cold, pulling hard against the outside walls. This force leads to the area around the bolts at the windows being pulled in on both ends. (It should be noted that steel normally expands and contracts at about ¼" per 10 feet, hence its retrofit installation into historic buildings must be carefully considered.) When summer returned, there was no way for the brick panels to move back to their earlier location, so the 1-1/2" inward thrust that occurred on the cemetery-facing wall remains, leaving a 3" overall difference in dimensions between the central bow point and the pulled-in panels.

* This is an approximate sequence.

Representation of deflections in NW wall if viewed from above:



The overall deflection in the wall from corners to the center remains 1-1/2" out of plumb (inward in some areas, out in others). From top to bottom the wall bows out 1-1/2" in the middle, but the top and bottom of the wall are plumb.

This is not an alarming deflection, but all of the underlying problems related to water need to be adequately addressed, the foundation repaired, the bolts removed, and the masonry panels at the bolts and around the windows pulled back into their appropriate alignment.

The central bow in the wall will be reduced as the bolt-related deflection is realigned. Drainage issues and soil stabilization should precede or run concurrent with realignment.

A stiffener set into the end wall on the inside to give rigidity at the second floor, acting in much the same way as the balconies help hold and triangulate the other walls, is also an option that can likely be made very unobtrusively.

Assessment of Structural Integrity:

This building was well constructed, providing several magnitudes of safety in all areas of construction.

Modern perceptions of footers aside, this building has very large foundations and the whole building acts essentially as a spread footer. Each successive floor going up gets narrower, in the process providing a ledge for the floor system (or balcony) above to rest on. This method of compression construction transfers the load of the roof and all floors (and the people and materials on them) down through the thick walls evenly to the ground. The first story is four bricks thick and at their base these walls are about 20" thick around the entire perimeter and are tied into the two equally thick stone walls running lengthwise underneath the building.

These interior stone walls divide the building into thirds to support the overlapping floor joists. In this way no floor joist is longer than about 12' with each overlap being secured by a large wooden pin driven through both joists. Unlike modern veneer construction, these walls are laid up in bricks that are bonded together inner to outer wythes at every fifth course, and the walls are loaded or secured in place by the floors resting on the walls and made more rigid by the wooden balcony structure running around three walls.

With subsidence of the ground around the NW wall and washing-out of the mortar in the foundation, some of the stones on the inside face of the NW foundation have rolled out of place. Because this has eliminated part of the redundancy and support for the building, these should be relaid promptly in lime mortar. With most of the water runoff from the entire property concentrated against this wall, the condition being created there is not unlike that which leads to California mudslides: the saturated soil becomes unstable and begins to slide downhill following the below-grade topography. The section of foundation at the center of this wall has bowed slightly, accommodating the sliding soil.

Unlike modern construction, one of the benefits of lime mortar construction is that it can more readily accommodate pressures and movement without cracking: it deforms, rather than shatters. The mortar joints remain tight in spite of the slide because the plasticity of lime mortar is so accommodating. The same processes of incremental (rather than abrupt) countervailing pressure can be used to realign masonry laid in lime mortar. It should be noted that modern spread footers would not be any better able to counteract the pressures of the ground below sliding sideways.

On the other hand, the areas exhibiting an inward thrust around the windows have experienced that pressure rather more quickly than the lime mortar could accommodate. This is most obvious on the entrance side of the building where the offset from one brick to the next is very noticeable, but all four masonry panels around the through bolts have been drawn closer to one another, pulling the adjacent window panels with them.

Recommendations:

1.) Relay stones that have rolled out of the foundation and grout all foundation voids.

2.) Promptly address the waterlogged soil along the NW wall. This means addressing grade height and drainage across the entire site. Designing a thorough drainage approach will require the input of both a soil geologist and archaeologists. A county soil geologist can take core samples to evaluate the type and condition of soil in the corridor between the NW wall of the church and the cemetery wall. Given the historic value of the site, archaeologists must be consulted from the beginning and remain on site during grading to ensure that intact archaeological deposits are not disturbed. While this list may sound very involved, and hence expensive, the cost of grade and drainage improvements, as well as gutter/downspout issues, is probably inside of $50,000.

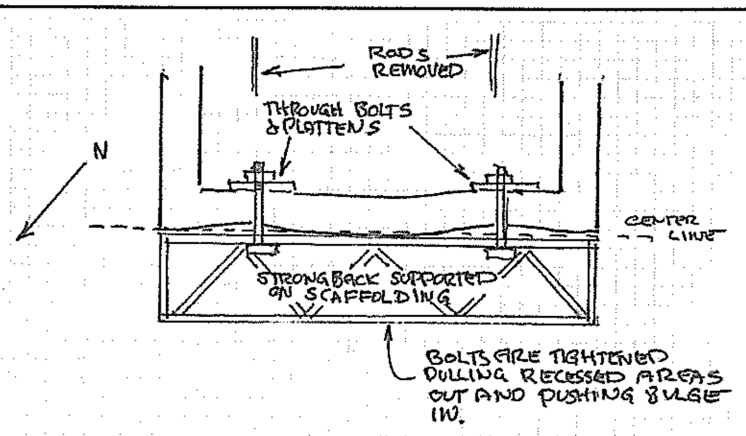
Immediate drainage improvements will consist of:

- Interrupting the flow of upland water with a swale to the South side of the church that will redirect this water toward the trees and lower ground behind the church.
- Sloping grade away from all sides of the building.
- Installing brick ground drains laid in soil to move water rapidly away and improve evaporation rate.
- Using a solid trough to carry downspout water several feet away from wall.
- Ensuring that all gutters are functioning optimally to carry water to the downspouts. Consider gutter redesign to take half of the roof water to the other end of the building.

3.) With water diverted away and the ground around the NW wall stabilized, realignment and repairs to the end wall can occur. A stiff strongback [site-built 2x4 and plywood truss?] will be stretched horizontally from corner to corner along the NW wall at the height of the larger tie rods. The inward and outward deflections can then be pulled and pushed back into significantly closer alignment. To do this, the tie rods that run the length of the building would need to be removed and the original ties set into the balcony beam would need to be loosened. Mortar in the major cracks at either side of the window panels would need to be cut out to allow movement back toward alignment. The holes left by the removal of the tie rods would be used to bolt through the wall to a padded plate on the inside. As pressure is tightened on the plate, the sections of wall would be coaxed toward realignment.

General Design for Realignment Mechanism:

view from above



Realignment will take some time so that the warped portions of the wall can deform back into place rather than break in the process. We expect this incremental process to occur over about six months. There is no absolute calculation as to how much pressure the wall can take without fracturing, so it will be done by carefully watching and listening to the wall. If the wall does crack in other places while moving back, the cracks can be repaired, but we would rather that not happen. We will endeavor not to break the wall in places that it is not already broken.

With realignment of the end wall under way, the roof can be replaced and mortar-making begun in preparation for repairing masonry across the building: taking out areas of inappropriate repointing or broken joints in the original mortar and filling voids such as those areas in the attic where daylight is visible through the end walls. An appropriate mortar match is one that is both physically and aesthetically comparable to the original. The best way to achieve this is to make the same mortar the builders used and which has survived admirably for 150 years. That mortar clearly comes from gently washed sand right at the base of the building.

The soil removed during grading should provide enough aggregate to mix with lime to for creating a perfect mortar match. As they did in the past, this mortar is best made and laid up well in advance. This early mixing allows the lime to stabilize any clays (just as is done in soil stabilization projects) and to provide an intimate binder-aggregate bond. Grouting of cracks and fissures with a graded lime mortar can precede repointing. At the same time, window sills can be reset to drain water away.

Once the masonry repairs and repointing are underway on the outside, interior repairs may be addressed. These can include:

- cleaning and vacuuming the plaster keys on the underside of the balcony and sounding plaster on the walls to identify weak areas that need reattachment,
- followed by plaster infill (again with a matching site-specific lime mortar) directly onto the original lath and masonry,
- paint removal on the walls and ceilings,
- repairs to damaged areas of the board ceiling, and
- weatherstripping the windows to make them weathertight without any change in appearance.

The building would then look much as it did 155 years ago. And in using the same materials as in the original construction, the building functions in harmony and is relatively low maintenance.

Photo Essay

Deflections in SE and NW Walls

Early on our first afternoon at the site, while starting to map deflections, we realized the problem was not as it appeared. The restraint bolts had deformed and broken both the NW and SE walls. On the SE, the deflection at the window panel is a sharp 3/4" offset. On the NW wall, it pulled the column to the outside of the windows and the window panel inward by up to 1-1/2", however the wall deformed uniformly inward so that there are no sharp edges; rather an even inward curvature at and to the outside edge of the windows.

SE wall above entrance has sharp ¾" inward deflection

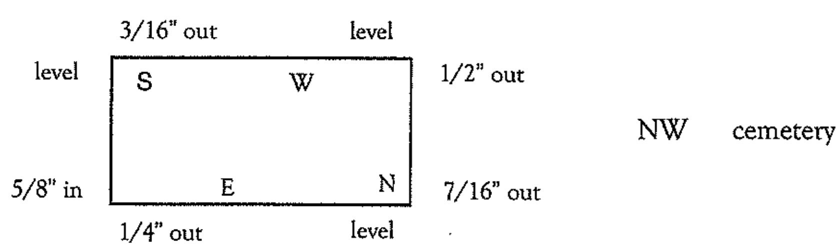
On the NW elevation, the central section of the wall is deformed outward 1-1/2" at the top of the first floor windows and is back to plumb by the top of the second floor windows relative to the foundation. The wall is 1" out of alignment across the horizontal at the foundation. This means the center of the wall between windows is 1-1/2" out relative to the corners.

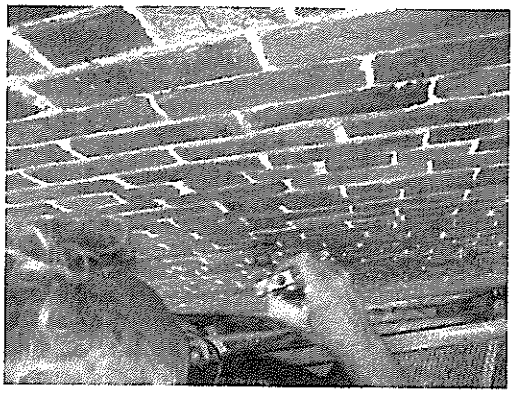
All of this means that nothing on the cemetery-facing wall is really hanging out in either direction more than 1-1/2". Thus, nothing is threatening to collapse.

(See string lines on the building to better visualize the in and out undulation).

For reference, there is some degree of lean at each of the four corners of the building; some outward, others inward. Only the East- and West-facing corners on the North end of the building and the West-facing corner of the South end are completely vertical. The other Southern corners are out 3/16 - 5/8". The cemetery-facing Northwest wall leans out 1/2" every 4'.

Corners out-of-level in 4' readings:



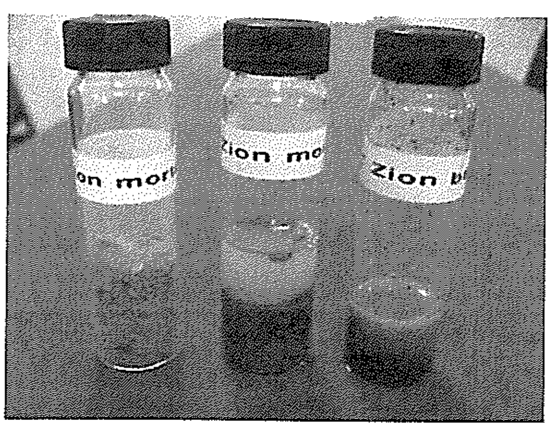


Hanging plumb bobs, pulling lines and using lasers helped determine the inward and outward deflections in the end wall.

It has been a number of years since the last repointing campaign and the only cracking of those repointed areas are a few hairline cracks. This confirms that none of the masonry is moving fast. That said, the foundation was originally constructed with redundancy. The loss of mortar and localized failures where stones are falling out of foundation means these areas have lost their redundancy.

In other words, while we are currently seeing only localized failure, if conditions are not addressed relatively soon, failure on a grander scale may develop. The whole North end of the building from the northwestern-most windows on the East and West sides has moved outward and downward from the rest of the building. This is generally down the slope of the hill following the natural topography. The displacement appears to be approximately 1-1/2" away and 1" down. The center panel of the Northwest wall has dropped slightly more.

Through all this movement, the wall has maintained its vertical orientation. Its center of gravity is still well within the width of its foundation. It is therefore not a collapse waiting to happen.



A sample of mortar was crushed to view the aggregate and silt colors for comparison against soil from the site. After a few gentle washings, soil from under the building and just outside the walls matched it nicely. Thus matching the 1850s mortars using on-site aggregates will be easy.

The crushed mortar is in the middle vial, soil at the right. Mineralogically and color-wise they match.

Foundations

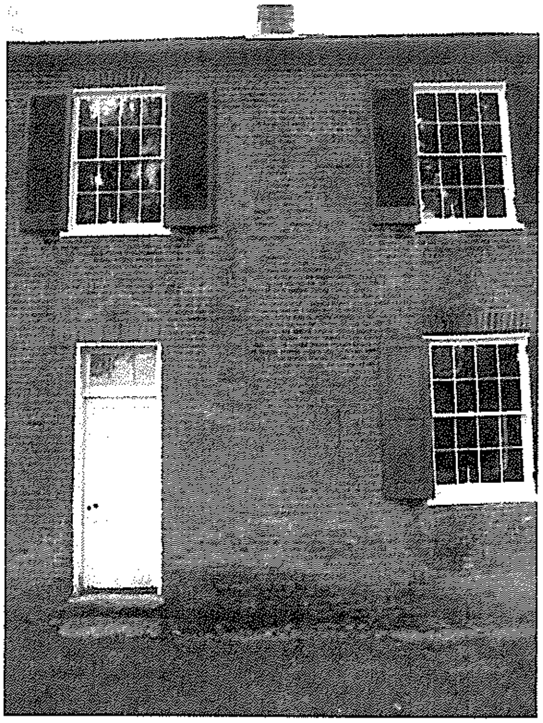
Stones have rolled out of the central section of the NW foundation as the ground beneath has subsided, reducing the compression on this wall.

Looking at one of the internal stone walls the downward slide of the wall following the subsiding soil is easier to visualize. At the left of this photograph is the second joist in from the NW foundation wall.

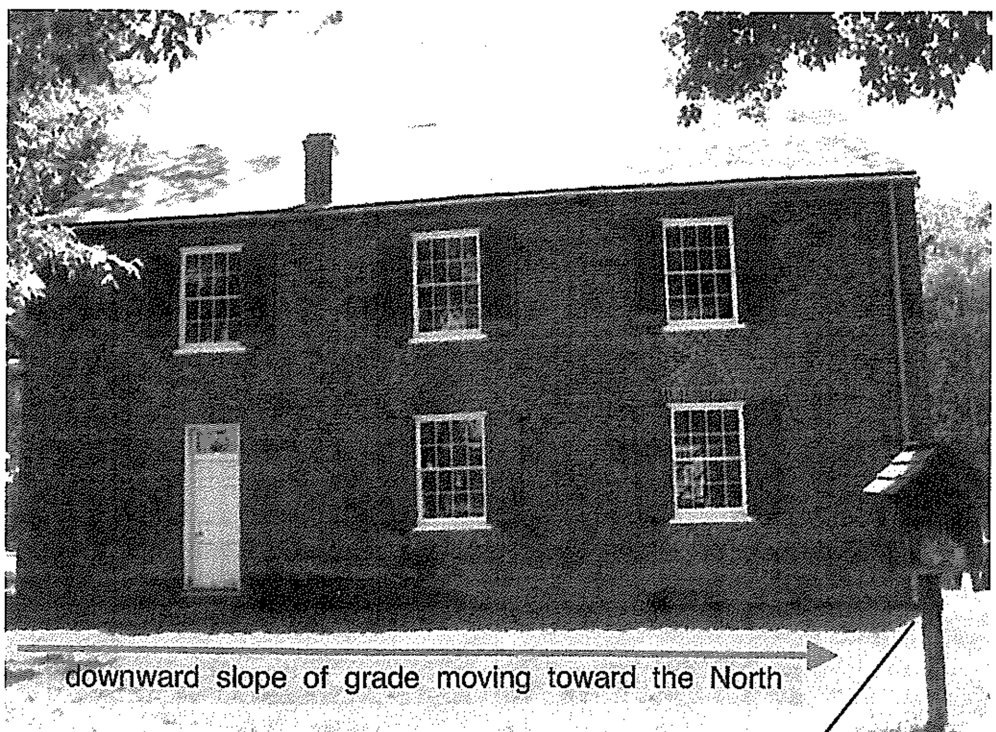
Grade Rise

The majority of water crossing the church property and all of the roof water from the downspouts is directed toward the North. With the 20th century installation of the cemetery wall against the church, the base of the Northwest wall has become an area for ponding water. This concentration of water at the base of the wall appears to be contributing to instability in the soil, similar to the conditions that create mudslides in California.

Between the entrance doors, the grade is quite high on the bricks. The building was constructed to have only non-porous stone in contact with the soil. As a result of being regularly wet, the mortar at the base of the wall has begun to fail.

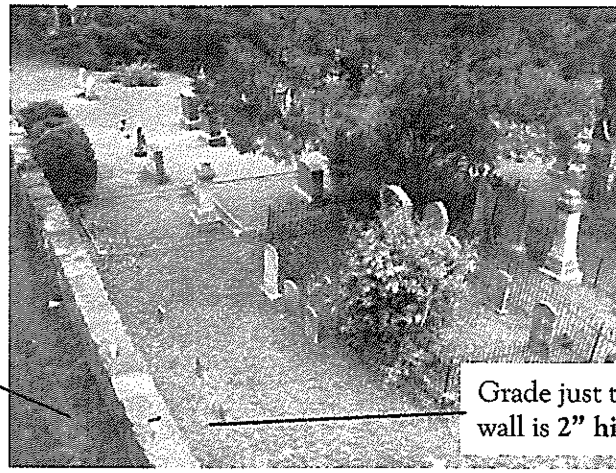


On the East or road-facing elevation, the failing gutter near the chimney feeds water down the wall, leading to algae growth. This is exacerbated in areas by portland re-pointing low on the building. Again, the bricks are in the dirt and a trough of water runs the length of the wall.



Downspout empties into a ground depression at North corner of building

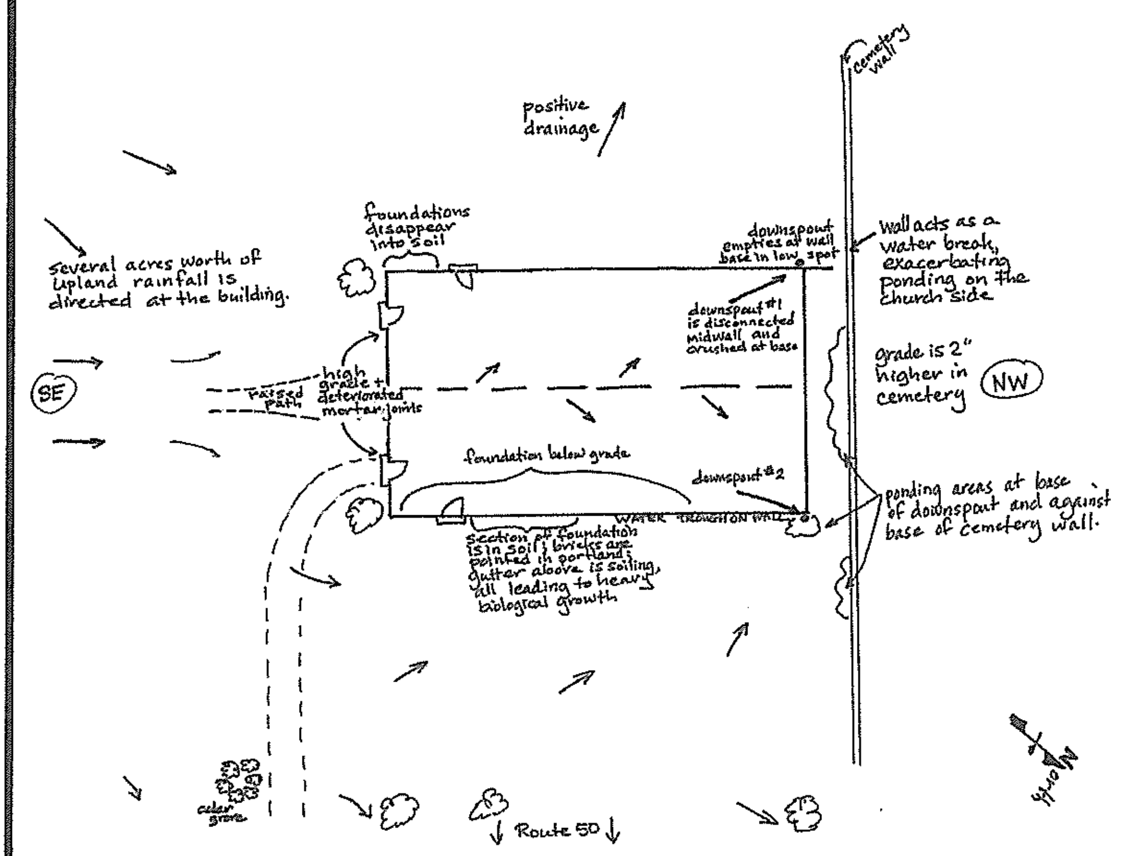
The cemetery wall acts as a barrier, trapping water against the base of the NW wall.
This coincides with being one of the lowest drainage points in the grade.
Most of the church property is already draining toward this location from the South.

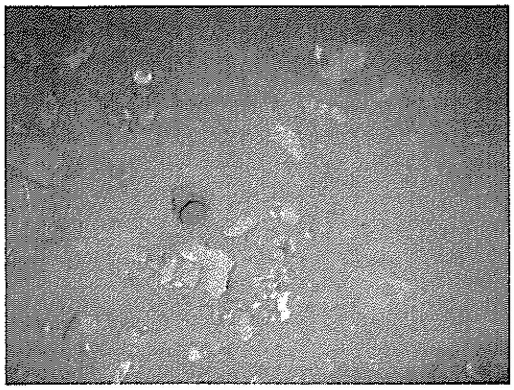


Lowest grade at center of church wall near cemetery

Grade just the other side of cemetery wall is 2" higher than church side

Overview of Current Site Drainage





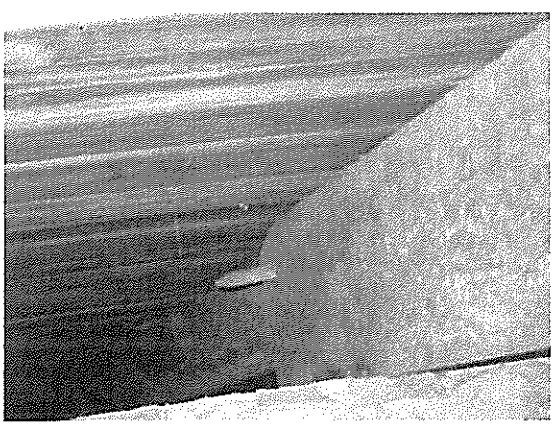
While working on the NW wall we noticed that the ground had a number of small holes in it and seemed slightly soft. Once we got under the floor, we noticed it too was littered with these approximately two inch holes. Is there a mole population softening the soil and helping to contribute to subsidence of the waterlogged soil on the NW end?

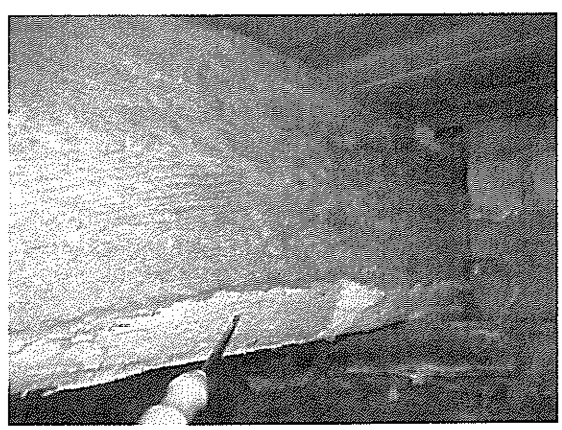
Although the soil under the house seems wet, this appears to be due predominantly to condensation. The installation of vents during the last century has magnified the humidity under the floors by allowing the space to experience the drastic spring and winter fluctuations in humidity and temperature that leads to water condensing on cold surfaces. On the South end of the building, however, the soil is significantly wetter. This appears to be due to the higher grade around that end of the building.

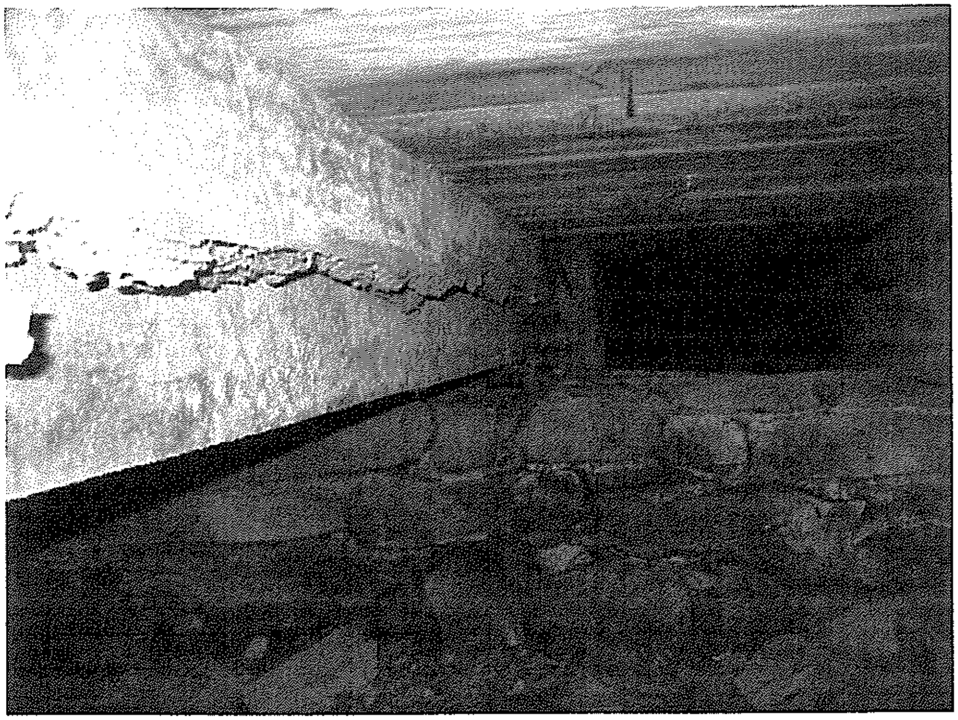
Floors

The overlap of joists occurs at the two under-floor stone walls running lengthwise through the building to divide it into thirds. At those intersections, the joists are pinned. Termites have traveled along the bottom of a few joists out from the wall a short distance, normally where there were still remnants of tree bark that are highly digestible. The termites tested out the top edge of several joists, but without causing serious damage to the joists. All joists are tight to the flooring above and seated firmly on the walls. Visible damage is the extent of damage. In other words, an ice pick could not be driven deeper into the joists beyond the damage seen in photographs.

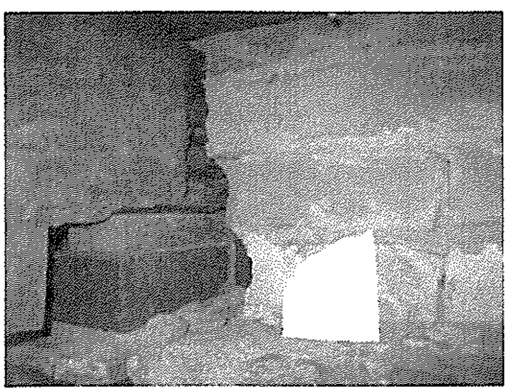
Termites require daily water, so only wet areas can maintain them.







Although earlier joists had been attacked by termites, adequate replacement or sistering with large oak joists has already been addressed. These joist repairs have good bearing on the outside walls and the internal stone walls, bear tightly against the flooring above and maintain the same overlap at the interior wall, including pinning the two joists together.



The most undermined joist pocket. Termites attacked the section of joist that sat in the brick wall. In this section of the building, the brick walls are below grade, leading to regular saturation. Although the damage in the wall looks bad, it is superficial, going only as deep as it looks.

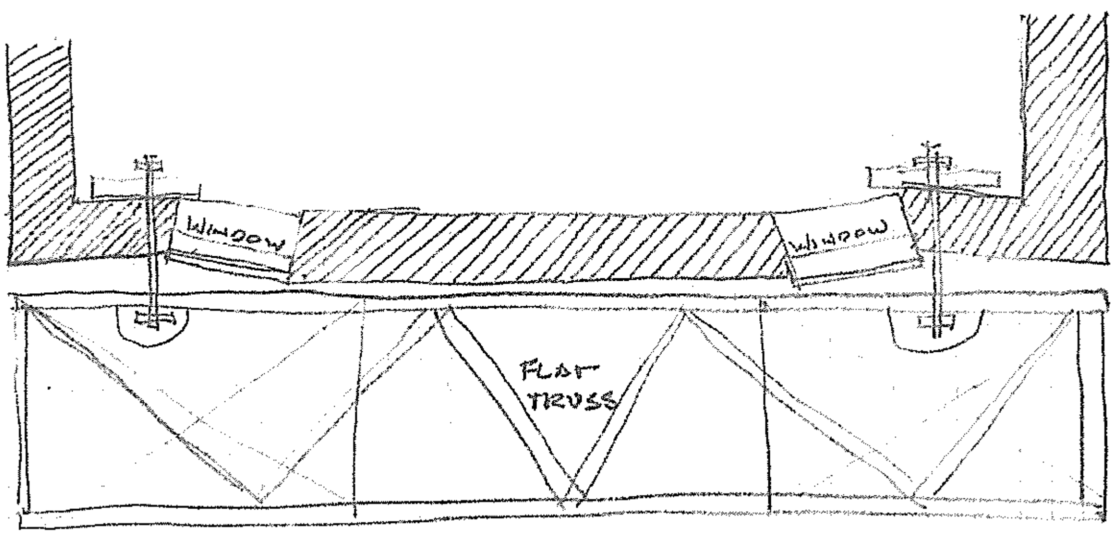
An ice pick could not be driven any deeper into the joist at the pocket in the wall or at any other point along its length. Even assuming the section in the brick wall was fully deteriorated, the joist still has more than 3" of bearing on the stone foundation.

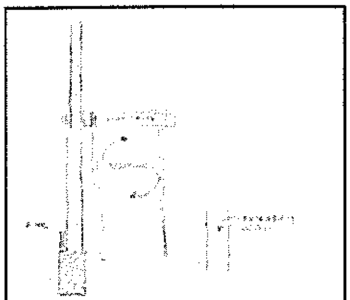
General Description of Repair Approaches:

The irregularities in the NW wall can be coaxed back into shape over about six months by incrementally increasing the pressure (push and pull) on the center of the areas that are most out of alignment. The backbone of this system will be an inflexible strongback running the length of the wall (probably something as simple as a wooden truss lying flat). We will be pressing between the first and second story windows where the both the outward and downward bow and the damage from the bolts pulling the window-area panels inward is at its greatest.

After removing the earlier through-building bolts, the deflected sections of wall around those holes can be pulled toward our truss by running a new bolt through the old bolt hole grab behind a flat platten on the inside of the wall, allowing us to put a wrench on the bolt and slowly tighten.

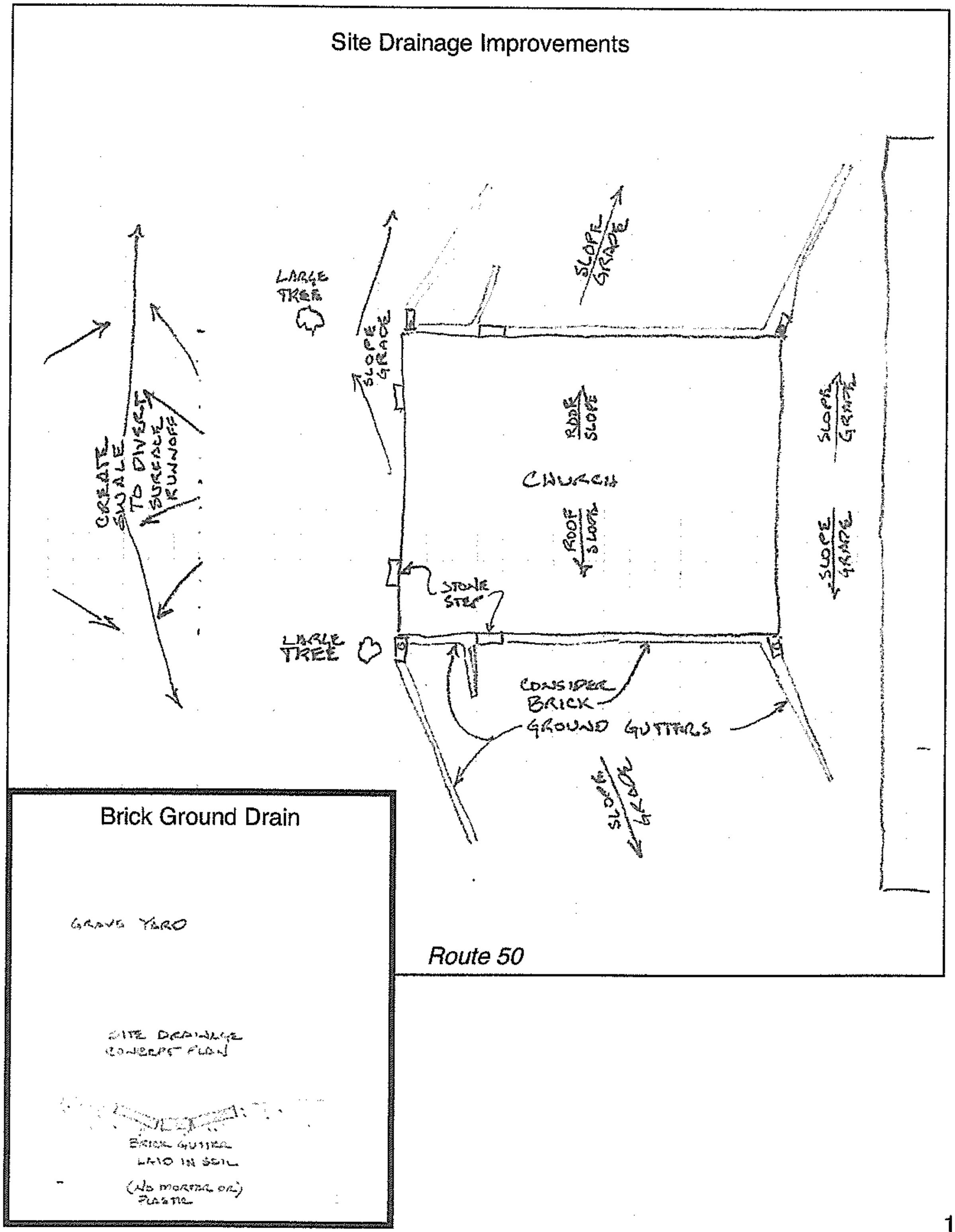
In the process, the outside of the mid-wall bow will slowly be pressed against as the truss is pulled toward the rest of the wall until it touches at the corners, brining the center into the same plane. Again the load of this pressure will be spread across the bulge, not centralized at one joint.





View from side

Although this straightening process may sound deceptively simple to the point of implausible, we have used it to realign walls throughout the Mid-Atlantic and Southeast over the last dozen years. Again, the plasticity and self-healing nature of lime mortar allows it to slowly accommodate the deformation without cracking as would occur with modern buildings constructed with portland cement and consisting of brick veneered over concrete block. The 1850s construction method bonds interior to exterior wythes (depth) of brick regularly, not through intermittent pins set in the joints as with modern construction.


Site Drainage Improvements
LARGE TREE
SLOPE GRADE
CREATE SWALE TO DIVERT SURFACE RUNOFF
ROOF SLOPE
CHURCH
STONE STEP
LARGE TREE
CONSIDER BRICK GROUND GUTTERS
Route 50
Brick Ground Drain
GRAVE YARD
SITE DRAINAGE CONCEPT PLAN
BRICK GUTTER LAID IN SOIL
(NO MORTAR OR PLASTIC)

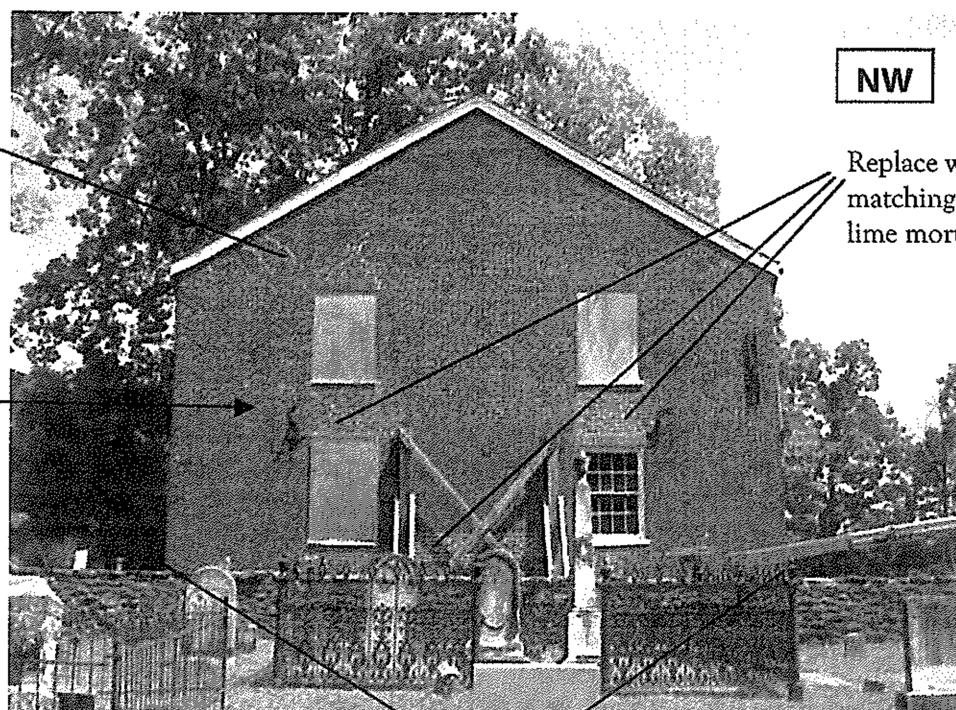
4' long cracks over right window should be repaired

Over-window repoints bear reworking in lime mortar

Mortar failure related to high grade.

Foundation on entrance elevation is full submerged, leaving bricks to bear brunt of uphill water and weathering.

4' long cracks need to be repaired in lime mortar



Replace with matching lime mortar

Wall deformation greatest between windows, both vertically and horizontally.

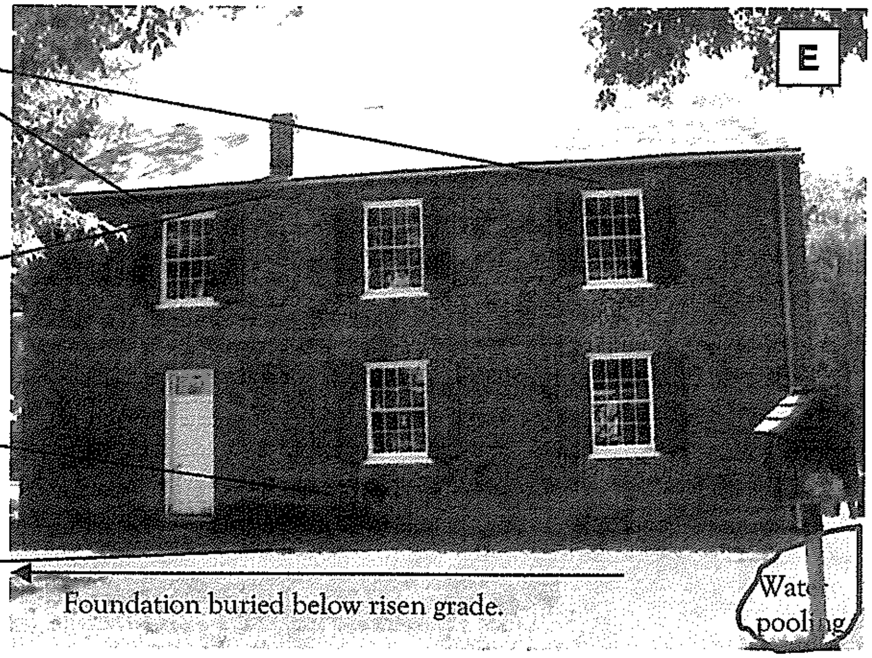
All roof water empties in two downspouts on this end. Downspouts dump at base of NW wall. This water joins with all upland water from the South in pooling against the cemetery wall.

Masonry collapsed due to original design flaw : trusses bear here

Gutter failing; spilling water onto wall below

Lower wall repointed in portland cement that traps water in wall

Failing gutter has created a depression in the ground that fills with rainwater



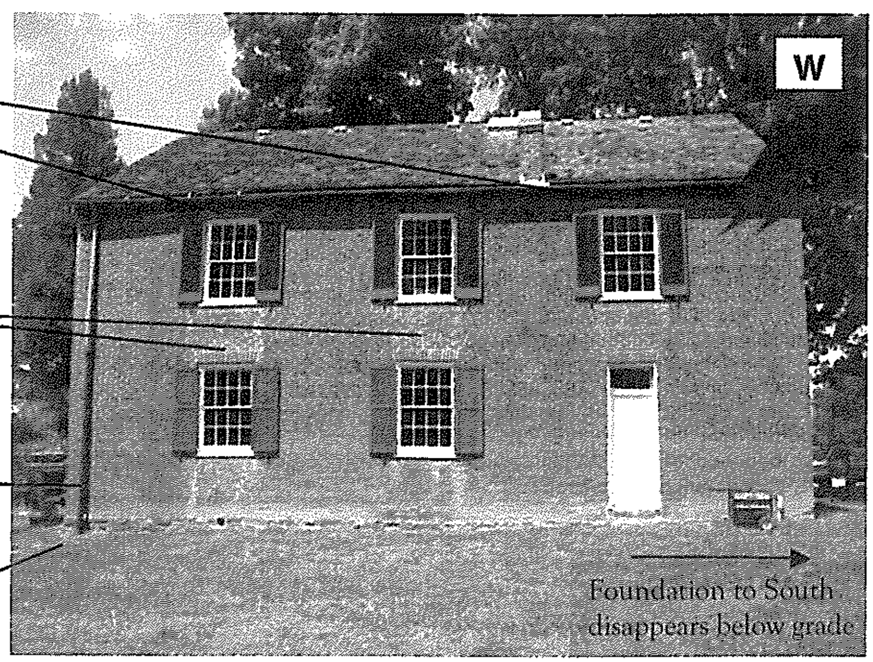
Road-facing elevation has many water issues. Upland water washes past and into a ground depression that runs the length of the wall. Gutter failure below the chimney feeds water down the wall. Inappropriate portland cement pointing repairs where the mortar has been washed out of joints due to splash-back from the leaking gutter is now causing the lower wall right of the door to remain constantly wet. The result: heavy algae growth outside and a wet crawlspace inside.

Masonry collapsed due to original design flaw : trusses bear here

Repair in lime mortar

Crack behind downspout to be repointed in lime

Downspout dumps at base of wall



The rear elevation has positive drainage to the treeline at the back of the property.

Remaining Questions to be Addressed:

- Results of soil geology cores
- Archaeological approach the state would require and/or results of test pits conducted along areas to be re-graded.
- Is there a mole colony under and around the building that needs to be relocated?

Team Experience in Realigning Masonry Walls

Compression masonry really lends itself to incremental realignment. Compression masonry refers to stacked masonry units separated by a cushioning soft, pliable lime mortar. Whether 30" stone walls or brick-thick chimneys or even rubble-filled walls, we have developed these realignment processes on projects throughout the Northeast over the last dozen years, beginning at Wyck House in Philadelphia in 1994 and currently in repairs to Menokin in Warsaw, VA.

Charles A. Phillips, AIA

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in History
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Historic American Buildings Survey 1975
Team member
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Full Scholarship

ACTIVITIES

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Charles Phillips, historical architect and conservator, began his career at age 16, teaching a course on furniture restoration in Alexandria, Va. followed by operating a restoration shop while attending the University of Texas where he received a BA in History, BArch, MArch in Preservation and started his formal study of Museology.

The US Navy contributed to his experience where his time was spent keeping a WWII vintage Destroyer operational in the Mediterranean Sea as Damage Control & Repair Div. Officer. As Director of Restoration at Old Salem, from 1976-1979, Phillips continued learning museum operations from the inside.

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Tinted plaster finishes, in neo-classical [1790's — 1840's] rooms.

Painted shingle roofs 18th and 19th c.

UV coatings for Historic Windows and Exterior Paints, both to preserve the exterior finishes and filter the light passing to the other artefacts within. [Wolbers]

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SOME AWARD WINNING PROJECTS
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John Greenwalt Lee

Materials Conservator and Artisan

John Greenwalt Lee has been a craftsman and conservator of objects and buildings for over thirty years. He provides individuals and organizations with timely solutions to difficult problems and practical answers to seemingly unsolvable ones. His management and organizational skills, ability to help owners budget conservation projects into manageable phases, and understanding of a site's comprehensive needs have earned accolades from stewards at dozens of National Historic Register properties.

John's approach to conservation is comprehensive: he develops a conditions assessment, plans and manages the project, does hands-on work on the scaffold, and shares his techniques and experience with other craftworkers. He presents his recommendations with an eye toward educating the client about the underlying causes of deterioration. His reports are technical yet clear and understandable to the layperson.

In 1967, at the age of seventeen, John set out on a series of apprenticeships in such well-known shops as ProMusica, Arpad, and Theodore Potthast Co. He gained mastery as a cabinetmaker specializing in the restoration and reproduction of antique musical instruments and as a builder of period furniture. He opened his own business at age 24 and over the next 14 years developed it into a 12-person shop creating reproduction millwork, custom interiors, and unique furnishings for architectural firms Interspace, Robert A. M. Stern, and Index.

From the beginning of John's career people sought his expertise for architectural preservation projects. His respect for historic objects and admiration for the artisans who created them led him to investigate the nature of the materials and the physical and chemical process that make them work: why they behave the way they do, how they can be manipulated, and the complex forces that cause failure. His early conservation mentors included architect Orin Bullock and Chief Historical Architect for the National Park Service Hugh Miller. He began working with seminal architectural materials conservator Morgan Phillips in 1974 while he was at SPNEA and was fortunate to work with architectural historian Paul Buchanan on many projects. His on-going work with architect and conservator Charles Phillips has been a source of inspiration for more than two decades. Together they continue to push the limits of materials conservation understanding.

By 1988 John was devoting his time exclusively to the conservation of historic buildings. John's regular collaborations over the last decade on projects of masonry failure, including Dumbarton Oaks, Hammond Harwood House, the Federal Reserve Bank in NY, private residences in Georgia and North Carolina, and sculptures in Washington, DC, have greatly increased his understanding of stone and brick structures, lime mortar construction, and the causes of masonry deterioration.

John continues his education and training today by working with a number of chemists to answer questions that still lack creditable explanation within the conservation field. He has written extensively on project design and management for historic structures, "invisible" masonry repair techniques and the elements of successful work with lime mortars, as well as contributing to the 1988 Historic Windows Conference handbook on wooden sash conservation. His research collaborations and development of new techniques and materials is well known in the conservation field.

In addition to his focus on masonry issues during the last decade, John is working with a talented tinsmith to improve training in historic crafts and the non-invasive repair of aged metal roofing. His interest in low toxicity methods for stripping finishes combined with the increasing failures on historic finishes arising from changing paint chemistry has lead to considerable work in finishes analysis, selective stripping back to sound paint layers, and finishes replication.

Selected Conservation Project Sites

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The Invisible Building: Design-driven Process vs. Discovering the Needs of Historic Buildings
University of Kentucky School of Architecture, 1999

Conservation Repair Techniques of Wood and Plaster: John Pope Villa and Miles Brewton House
Washington Conservation Guild and National Trust for Historic Preservation, Washington DC, 1998

Common Problems with Historic Roofs:
Owner, Architect and Contractor
APT Roofing Conference, Washington DC, 1993

Considerations and Case Studies in the Conservation of Wooden Architectural Artifacts
Conservation Training Program, 1990,
Smithsonian Conservation Analytical Laboratory

John Greenwalt Lee
Materials Conservator and Artisan

Conditions Assessments:

From his wide-ranging background, John combines artisan skills and the analytic approach of scientific observation to analyze building problems and devise minimally-invasive and material-appropriate repairs that inform the still infant American architectural conservation community.

He believes documentation alone is of limited use in educating the client or saving buildings. Analysis of the data must provide a clear explanation of the causes of deterioration so that practical solutions can be developed.

The alternative is treatments that are conducted without knowledge and mitigation of the underlying causes; a short-sighted, fiscally-irresponsible and often destructive approach.

> "What a great report. We actually understand now what's going on with our building!"
>
> *-Carol Hutchinson, President (ret.), Hammond Harwood House Association, Annapolis, Maryland, 2000*

Treatment Focus:

Comprehensive treatment of a project based on understanding the original building technology and the interactions with any new materials introduced. To successfully treat an object or building within the context of its site requires a conservator-craftsman-facilitator able to:

- Conduct "above-ground archaeology," or outline a construction and repair chronology using building evidence.
- Analyze and document building conditions in concise reports clearly detailing cause and effect.
- Research and develop conservation treatments and tools for deteriorated materials. No two projects are the same. Broad knowledge of materials and techniques is necessary to choose the right combination for each project or develop new processes where necessary across a range of building materials including wood, bricks and mortar, paint, clear finishes, stone, terracotta, plaster and metals.
- Provide planning and budget assistance, in addition to the organizational skills to supervise artisan-contractor-conservator-architect-engineer teams while continuing to provide useful feedback to the building owners.
- Train skilled craftsmen and contractors in traditional methods and materials, as well as newly developed building conservation techniques.
- Treat historic fabric using a combination of techniques that may include consolidation, stabilization and replication methods for deteriorated wood, plaster, finishes, and bricks and mortar.
- Replicate missing elements.

> "Through your research and development efforts, you broke new ground in architectural finish conservation. We are extremely pleased with the final results.... [and] I must compliment you on the speed with which you provided me with your final project report."
>
> *-Eryl Platzer, writing as director and restoration supervisor at the Valentine Museum, now at Decatur House*

> Many thanks for your presentation yesterday at the Board meeting. Everyone was very impressed and excited about the project. It is clear that you have done an incredible job and you should be very proud of the results.
>
> Thank you so much for your dedication, for sharing your knowledge and for helping preserve HHH.
>
> *-Susan Parker, President, Hammond Harwood House Association President, 11/13/2001.*

John Greenwalt Lee

Materials Conservator and Artisan

Artisan Qualifications:

- Antiques restoration
- Musical instrument restoration
- Reproduction furniture
- Cabinetmaking
- Boat building
- Pattern-making
- Tool making
- Prototype fabrication

ProMusica Instrument Co., Annapolis, MD
Restoration of rare antique musical instruments for museum collections (Winterthur, Independence Hall, Yale Collection) 1968-1969.

Arpad, Inc., Washington, DC
Restoration of fine antique furniture, using Chinese lacquer, ivory, 17th century Venetian painting, inlay, carving and ormolu, 1969-70.

Michael Thomas, London, England
Preparation and supervision of rare musical instrument collection for Sotheby's Auction, 1971.

Theodore Potthast Co., Baltimore, MD
Queen Anne and Chippendale hand-built reproductions of tables, chairs and sideboards, 1971-72.

Danko Arlington, Baltimore, MD
Close-tolerance pattern making, machining, foundary practices, and prototypes, 1973-74.

John Greenwalt Lee Co., Annapolis, MD

1974 – 1988: Twelve-person cabinet shop specializing in replication of 17th-19th century furniture and finishes, restoration of 18th century architectural wood ornamentation, and building unique furniture and millwork creations for architectural-design firms including Robert A.M. Stern, Index and Interspace for Houston, New York, Boston, Washington D.C., and Richmond VA projects.

1988 – current: An independent materials conservation business focused on passing the skills and knowledge of many trades to a new generation of artisans. This requires providing clear, thorough explanations of the deterioration processes at work on buildings and re-introducing modern construction personnel to the methods and materials used in the past to develop to ensure responsible and long-lasting repairs to historic structures.

Lecture Topics and Training Provided:

> "John has devoted himself to research and job tested methods.... Unlike many craftsmen, he has shown an unusual desire to train others by sharing his knowledge...."
>
> *-The late Orin Bullock, Jr., FAIA, in 1978 referring to work at Hammond Harwood House*

- Stabilization & repair techniques for historic buildings
- Conservation treatments for wood, finishes and masonry
- Replication of missing wooden ornamentation
- Replication of historic clear and painted finishes
- Planning, organization, budgeting and supervising
- Documentation of deterioration processes & analysis

SELECT PROJECT HIGHLIGHTS

Dumbarton Oaks Gardens

(Owner: Harvard University)

Washington, DC – 1920

Ten acres of formal gardens designed by Beatrix Farrand surround the Dumbarton Oaks Library and Museum of Byzantine and Pre-Columbian Studies. Over two years, John and chemist Jim Adams studied the built environment including exterior woodwork, pools and stone monuments. Together they conserved and repaired a limestone bench in the Rose Garden in 2001.

Hammond Harwood House

(Owner: Hammond Harwood House Association)

Annapolis, MD – 1774

This masterpiece of renowned designer William Buckland is often considered one of the finest examples of five-part Georgian architecture in colonial America. John's work at the site has included preservation and replication of both interior and exterior wooden elements and finishes, stabilization of attic timbers in advance of his replacement of a slate roof and, at present, and development of techniques for invisibly repairing damaged exterior masonry as part of a 'drop' to estimate time, cost and techniques for the entire building.

Wyck House and Gardens

(Managed by Wyck Association)

Philadelphia, PA – 1690

A colonial era house remodeled by William Strickland in 1824 and owned by nine generations of one family. Projects to date have included documentation and assessment of original exterior building fabric, development of a phased conservation plan for the main house and outbuildings, stabilization and treatment of the exterior woodwork, preservation of the 18th-century lime stucco and reintroduction of wood shingle and slate roofs on the main house. The Wyck Exterior Conservation Project won state and national awards in 1998.

The James Brice House

(Owner: International Masonry Institute)

Annapolis, MD – 1766

This five-part Georgian is headquarters of the International Masonry Institute, the training arm of the bricklayer's union. Projects include extensive site grade changes, installation of an outdoor drainage plan and design of heated walkways to eliminate the need for de-icing salts, multiple exterior woodwork repairs and a grand new entrance stairway. Work on the West Wing has included removal of damaging salts, repairs to interior original masonry, and the creation of a new interior within the remains of the 18th century building fabric that highlights below-ground lime pit archaeology while creating a state-of-the-art conference and library facility.

PARTIAL LIST OF PROJECTS

Chrysler Building
New York, NY

Cosby House
New York City, NY

Darnall's Chance
Upper Marlboro, MD

Dumbarton Oaks
Washington, DC

Federal Reserve Bank
New York City, NY

Government House
St. Croix, Virgin Islands

Grasslands
Anne Arundel County, MD

Gunston Hall
Lorton, VA

Hall House
Salisbury, NC

Hammond Harwood
Annapolis, MD

Hancock's Resolution
Anne Arundel County, MD

Holly Hill
Friendship, MD

James Brice House
Annapolis, MD

John Pope Villa
Lexington, KY

Johnson House
Philadelphia, PA

London Towne Publik House
Edgewater, MD

Maymont
Richmond, VA

Miles Brewton House
Charleston, SC

Monticello
Charlottesville, VA

Moody Mansion
Galveston, TX

Nathanial Russell House
Charleston, SC

Octagon House
Washington, DC

Old Nacogdoches University
Nacogdoches, TX

Piney Point Lighthouse
Saint Mary's County, MD

805 and 809 Prince Street
Alexandria, VA

Ridout House
Annapolis, MD

Sands House
Annapolis, MD

Sheehan House
Duxbury, MA

Solitude
Philadelphia, PA

St. Pauls Church
Alexandria, VA

Stratford Hall
Westmoreland County, VA

Swedish Cottage
Central Park, NY

Tudor Place
Washington, DC

U.S. Naval Academy
Annapolis, MD

Wickham-Valentine House
Richmond, VA

William Paca House
Annapolis, MD

Wyck House & Gardens
Philadelphia, PA

Ximinez-Fatio House
St. Augustine, FL

Yale University
Silliman Library and The Great Hall
New Haven, CT

U.S. General Services Admin.
Washington, DC:

- Federal Trade Commission
  "Man Controlling Trade" sculpture
- National Building Museum
  Entrance stonework
- Department of Justice
  Terracotta Roof Antefixae
- Ariel Rios EPA Building
  Commissioners Corridor finishes
- Department of Agriculture
  Auditors' Building Masonry
- Department of Commerce
  Stone and Metal Cornice Failure

RECOMMENDATION LETTERS

"Your blend of craftsmanship and scientific knowledge I feel is a rare commodity and is ideally suited to historic houses which are trying to preserve their buildings but to also have them function as museums and places for educational experiences. So often during a complicated preservation project an historic house director finds himself caught between many members of the team all with seemingly valid points of view. That is why I have come to rely upon your advice and mediation to help find the best solution. It is also why Wyck keeps coming back to you for all of our projects."

--Jeff Groff, Director - Wyck House Assn., 2000

"I continue to be amazed at all you accomplished and grateful for your expertise and faithfulness to the job."

-- John Sheftall – private client, 2004

"Your emphasis on the people who actually do the work and on rethinking the standard processes that are routinely used has completely changed the way I look at buildings. It has also inspired me with a desire to make your approach central to the philosophy of our new graduate program in historic preservation [at the University of Kentucky].

You have consistently brought the best in preservation technology to our project, although you are anything but an uncritical consumer of new products. You worked with Morgan Phillips to develop unique consolidants and adhesives to conserve the most important plaster at the house at a time when no one in Kentucky was even thinking of conserving plaster, to say nothing of developing special products to do it.

Finally, you have been a superb manager, keeping together a team of some of the weirdest and most contentious human beings in the universe. As snafus appear, you are on the phone (or on email) to cajole, plead, joke, weep, and in all other ways do your best to keep our crazy ship on course. I can tell you that your human skills in working things out are as extraordinary as your technical skills on the scaffold."

--Daniel B. Rowland, University of Kentucky Gaines Center for the Humanities and previous director of the John Pope Villa Project, 2000

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Conservation Repair Techniques of Wood and Plaster: John Pope Villa and Miles Brewton House
Washington Conservation Guild and National Trust for Historic Preservation, Washington DC, 1998

Common Problems with Historic Roofs: Owner, Architect and Contractor
APT Roofing Conference, Washington DC, 1993

Considerations and Case Studies in the Conservation of Wooden Architectural Artifacts
Conservation Training Program, 1990, Smithsonian Conservation Analytical Laboratory

John Greenwalt Lee has been a craftsman and conservator of objects and buildings for over thirty years. He provides individuals and organizations with timely solutions to difficult problems and practical answers to seemingly unsolvable ones. His management and organizational skills, ability to help owners budget conservation projects into manageable phases, and understanding of a site's comprehensive needs have earned accolades from stewards at dozens of National Historic Register properties.

John's approach to conservation is comprehensive: he develops a conditions assessment, plans and manages the project, does hands-on work on the scaffold, and shares his techniques and experience with other craftworkers. He presents his recommendations with an eye toward educating the client about the underlying causes of deterioration. His reports are technical yet clear and understandable to the layperson.

In 1967, at the age of seventeen, John set out on a series of apprenticeships in such well-known shops as ProMusica, Arpad, and Theodore Potthast Co. He gained mastery as a cabinetmaker specializing in the restoration and reproduction of antique musical instruments and as a builder of period furniture. He opened his own business at age 24 and over the next 14 years developed it into a 12-person shop creating reproduction millwork, custom interiors, and unique furnishings for architectural firms Interspace, Robert A. M. Stern, and Index.

From the beginning of John's career people sought his expertise for architectural preservation projects. His respect for historic objects and admiration for the artisans who created them led him to investigate the nature of the materials and the physical and chemical process that make them work: why they behave the way they do, how they can be manipulated, and the complex forces that cause failure. His early conservation mentors included architect Orin Bullock and Chief Historical Architect for the National Park Service Hugh Miller. He began working with seminal architectural materials conservator Morgan Phillips in 1974 while he was at SPNEA and was fortunate to work with architectural historian Paul Buchanan on many projects. His on-going work with architect and conservator Charles Phillips has been a source of inspiration for more than two decades. Together they continue to push the limits of materials conservation understanding.

By 1988 John was devoting his time exclusively to the conservation of historic buildings. John's regular collaborations over the last decade on projects of masonry failure, including Dumbarton Oaks, Hammond Harwood House, the Federal Reserve Bank in NY, private residences in Georgia and North Carolina, and sculptures in Washington, DC, have greatly increased his understanding of stone and brick structures, lime mortar construction, and the causes of masonry deterioration.

John continues his education and training today by working with a number of chemists to answer questions that still lack creditable explanation within the conservation field. He has written extensively on project design and management for historic structures, "invisible" masonry repair techniques and the elements of successful work with lime mortars, as well as contributing to the 1988 Historic Windows Conference handbook on wooden sash conservation. His research collaborations and development of new techniques and materials is well known in the conservation field.

In addition to his focus on masonry issues during the last decade, John is working with a talented tinsmith to improve training in historic crafts and the non-invasive repair of aged metal roofing. His interest in low toxicity methods for stripping finishes combined with the increasing failures on historic finishes arising from changing paint chemistry has lead to considerable work in finishes analysis, selective stripping back to sound paint layers, and finishes replication.

John Greenwalt Lee
Materials Conservator and Artisan

Conditions Assessments:

"What a great report. We actually understand now what's going on with our building!"

-Carol Hutchinson, President (ret.),
Hammond Harwood House Association, Annapolis, Maryland, 2000

From his wide-ranging background, John combines artisan skills and the analytic approach of scientific observation to analyze building problems and devise minimally-invasive and material-appropriate repairs that inform the still infant American architectural conservation community.

He believes documentation alone is of limited use in educating the client or saving buildings. Analysis of the data must provide a clear explanation of the causes of deterioration so that practical solutions can be developed.

The alternative is treatments that are conducted without knowledge and mitigation of the underlying causes; a short-sighted, fiscally-irresponsible and often destructive approach.

Treatment Focus:

"Through your research and development efforts, you broke new ground in architectural finish conservation. We are extremely pleased with the final results.... [and] I must compliment you on the speed with which you provided me with your final project report."

-Eryl Platzer, writing as director and restoration supervisor at the Valentine Museum, now at Decatur House

Many thanks for your presentation yesterday at the Board meeting. Everyone was very impressed and excited about the project. It is clear that you have done an incredible job and you should be very proud of the results.

Thank you so much for your dedication, for sharing your knowledge and for helping preserve HHH.

-Susan Parker, President,
Hammond Harwood House Association President, 11/13/2001.

Comprehensive treatment of a project based on understanding the original building technology and the interactions with any new materials introduced. To successfully treat an object or building within the context of its site requires a conservator-craftsman-facilitator able to:

- Conduct "above-ground archaeology," or outline a construction and repair chronology using building evidence.
- Analyze and document building conditions in concise reports clearly detailing cause and effect.
- Research and develop conservation treatments and tools for deteriorated materials. No two projects are the same. Broad knowledge of materials and techniques is necessary to choose the right combination for each project or develop new processes where necessary across a range of building materials including wood, bricks and mortar, paint, clear finishes, stone, terracotta, plaster and metals.
- Provide planning and budget assistance, in addition to the organizational skills to supervise artisan-contractor-conservator-architect-engineer teams while continuing to provide useful feedback to the building owners.
- Train skilled craftsmen and contractors in traditional methods and materials, as well as newly developed building conservation techniques.
- Treat historic fabric using a combination of techniques that may include consolidation, stabilization and replication methods for deteriorated wood, plaster, finishes, and bricks and mortar.
- Replicate missing elements.

The John Greenwalt Lee Company – P.O. Box 724 – Annapolis, Maryland 21404 – Phone: 443-306-4334

John Greenwalt Lee
Materials Conservator and Artisan

Artisan Qualifications:

- Antiques restoration
- Musical instrument restoration
- Reproduction furniture
- Cabinetmaking
- Boat building
- Pattern-making
- Tool making
- Prototype fabrication

ProMusica Instrument Co., Annapolis, MD
Restoration of rare antique musical instruments for museum collections (Winterthur, Independence Hall, Yale Collection) 1968-1969.

Arpad, Inc., Washington, DC
Restoration of fine antique furniture, using Chinese lacquer, ivory, 17th century Venetian painting, inlay, carving and ormolu, 1969-70.

Michael Thomas, London, England
Preparation and supervision of rare musical instrument collection for Sotheby's Auction, 1971.

Theodore Potthast Co., Baltimore, MD
Queen Anne and Chippendale hand-built reproductions of tables, chairs and sideboards, 1971-72.

Danko Arlington, Baltimore, MD
Close-tolerance pattern making, machining, foundary practices, and prototypes, 1973-74.

John Greenwalt Lee Co., Annapolis, MD

1974 – 1988: Twelve-person cabinet shop specializing in replication of 17th-19th century furniture and finishes, restoration of 18th century architectural wood ornamentation, and building unique furniture and millwork creations for architectural-design firms including Robert A.M. Stern, Index and Interspace for Houston, New York, Boston, Washington D.C., and Richmond VA projects.

1988 – current: An independent materials conservation business focused on passing the skills and knowledge of many trades to a new generation of artisans. This requires providing clear, thorough explanations of the deterioration processes at work on buildings and re-introducing modern construction personnel to the methods and materials used in the past to develop to ensure responsible and long-lasting repairs to historic structures.

Lecture Topics and Training Provided:

> "John has devoted himself to research and job tested methods.... Unlike many craftsmen, he has shown an unusual desire to train others by sharing his knowledge...."
>
> *-The late Orin Bullock, Jr., FAIA, in 1978 referring to work at Hammond Harwood House*

- Stabilization & repair techniques for historic buildings
- Conservation treatments for wood, finishes and masonry
- Replication of missing wooden ornamentation
- Replication of historic clear and painted finishes
- Planning, organization, budgeting and supervising
- Documentation of deterioration processes & analysis

SELECT PROJECT HIGHLIGHTS

Dumbarton Oaks Gardens
(Owner: Harvard University)
Washington, DC – 1920

Ten acres of formal gardens designed by Beatrix Farrand surround the Dumbarton Oaks Library and Museum of Byzantine and Pre-Columbian Studies. Over two years, John and chemist Jim Adams studied the built environment including exterior woodwork, pools and stone monuments. Together they conserved and repaired a limestone bench in the Rose Garden in 2001.

Hammond Harwood House
(Owner: Hammond Harwood House Association)
Annapolis, MD – 1774

This masterpiece of renowned designer William Buckland is often considered one of the finest examples of five-part Georgian architecture in colonial America. John's work at the site has included preservation and replication of both interior and exterior wooden elements and finishes, stabilization of attic timbers in advance of his replacement of a slate roof and, at present, and development of techniques for invisibly repairing damaged exterior masonry as part of a 'drop' to estimate time, cost and techniques for the entire building.

Wyck House and Gardens
(Managed by Wyck Association)
Philadelphia, PA – 1690

A colonial era house remodeled by William Strickland in 1824 and owned by nine generations of one family. Projects to date have included documentation and assessment of original exterior building fabric, development of a phased conservation plan for the main house and outbuildings, stabilization and treatment of the exterior woodwork, preservation of the 18th-century lime stucco and reintroduction of wood shingle and slate roofs on the main house. The Wyck Exterior Conservation Project won state and national awards in 1998.

The James Brice House
(Owner: International Masonry Institute)
Annapolis, MD – 1766

This five-part Georgian is headquarters of the International Masonry Institute, the training arm of the bricklayer's union. Projects include extensive site grade changes, installation of an outdoor drainage plan and design of heated walkways to eliminate the need for de-icing salts, multiple exterior woodwork repairs and a grand new entrance stairway. Work on the West Wing has included removal of damaging salts, repairs to interior original masonry, and the creation of a new interior within the remains of the 18th century building fabric that highlights below-ground lime pit archaeology while creating a state-of-the-art conference and library facility.

PARTIAL LIST OF PROJECTS

Chrysler Building
New York, NY

Cosby House
New York City, NY

Darnall's Chance
Upper Marlboro, MD

Dumbarton Oaks
Washington, DC

Federal Reserve Bank
New York City, NY

Government House
St. Croix, Virgin Islands

Grasslands
Anne Arundel County, MD

Gunston Hall
Lorton, VA

Hall House
Salisbury, NC

Hammond Harwood
Annapolis, MD

Hancock's Resolution
Anne Arundel County, MD

Holly Hill
Friendship, MD

James Brice House
Annapolis, MD

John Pope Villa
Lexington, KY

Johnson House
Philadelphia, PA

London Towne Publik House
Edgewater, MD

Maymont
Richmond, VA

Miles Brewton House
Charleston, SC

Monticello
Charlottesville, VA

Moody Mansion
Galveston, TX

Nathanial Russell House
Charleston, SC

Octagon House
Washington, DC

Old Nacogdoches University
Nacogdoches, TX

Piney Point Lighthouse
Saint Mary's County, MD

805 and 809 Prince Street
Alexandria, VA

Ridout House
Annapolis, MD

Sands House
Annapolis, MD

Sheehan House
Duxbury, MA

Solitude
Philadelphia, PA

St. Pauls Church
Alexandria, VA

Stratford Hall
Westmoreland County, VA

Swedish Cottage
Central Park, NY

Tudor Place
Washington, DC

U.S. Naval Academy
Annapolis, MD

Wickham-Valentine House
Richmond, VA

William Paca House
Annapolis, MD

Wyck House & Gardens
Philadelphia, PA

Ximinez-Fatio House
St. Augustine, FL

Yale University
Silliman Library and The Great Hall
New Haven, CT

U.S. General Services Admin.
Washington, DC:

- Federal Trade Commission
  "Man Controlling Trade" sculpture
- National Building Museum
  Entrance stonework
- Department of Justice
  Terracotta Roof Antefixae
- Ariel Rios EPA Building
  Commissioners Corridor finishes
- Department of Agriculture
  Auditors' Building Masonry
- Department of Commerce
  Stone and Metal Cornice Failure

RECOMMENDATION LETTERS

"Your blend of craftsmanship and scientific knowledge I feel is a rare commodity and is ideally suited to historic houses which are trying to preserve their buildings but to also have them function as museums and places for educational experiences. So often during a complicated preservation project an historic house director finds himself caught between many members of the team all with seemingly valid points of view. That is why I have come to rely upon your advice and mediation to help find the best solution. It is also why Wyck keeps coming back to you for all of our projects."

--Jeff Groff, Director -Wyck House Assn., 2000

"I continue to be amazed at all you accomplished and grateful for your expertise and faithfulness to the job."

-- John Sheftall – private client, 2004

"Your emphasis on the people who actually do the work and on rethinking the standard processes that are routinely used has completely changed the way I look at buildings. It has also inspired me with a desire to make your approach central to the philosophy of our new graduate program in historic preservation [at the University of Kentucky].

You have consistently brought the best in preservation technology to our project, although you are anything but an uncritical consumer of new products. You worked with Morgan Phillips to develop unique consolidants and adhesives to conserve the most important plaster at the house at a time when no one in Kentucky was even thinking of conserving plaster, to say nothing of developing special products to do it.

Finally, you have been a superb manager, keeping together a team of some of the weirdest and most contentious human beings in the universe. As snafus appear, you are on the phone (or on email) to cajole, plead, joke, weep, and in all other ways do your best to keep our crazy ship on course. I can tell you that your human skills in working things out are as extraordinary as your technical skills on the scaffold."

--Daniel B. Rowland, University of Kentucky Gaines Center for the Humanities and previous director of the John Pope Villa Project, 2000